Kurdistan Regional Government- Iraq
Ministry of Higher Education and Scientific

University of Sulaimani
College of Science
Department of Biology

Microscopical study of ectoparasites from freshwater ornamental fish

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Abstract:

The primary problem with ornamental fish is still parasites, followed by mortality and a decline in attractiveness. The objective of the present study was to investigate the parasitic infection in two species of freshwater ornamental fishes in different aquarium places in Sulaymaniyah City. This study was undertaken from January to the end of April 2024. A total of 75 fish; guppy (Poecilia reticulata) and molly (Poecilia sphenops) were examined. The study revealed the existence of two species of protozoans (Ichthyophthirius multifiliis and Trichodina sp.), one species of crustacea (Copepodal stage lernaea cyprinacea), and one species of monogeneans (Gyrodactylus baicalensis) were recorded from these fish in their skin and gills, by using the wet mount method under a light microscope. The overall parasitic infection in examined fish was 26.66%, with 12 guppy fish and 8 molly fish infected.

Keywords: Ornamental fish, Guppy, Molly, Parasites, Prevalence

Introduction:

The impacts of fish parasites have come to light more and more in recent decades in relation to the global growth of the freshwater ornamental fish industries. Ectoparasitic infections in freshwater ornamental fishes are diagnosed by wet mount cytology preparations of skin scrapes, gill biopsies, and by direct observation (macroscopic parasites) (Koyuncu 2010). Parasitic protozoans, acanthocephalans, nematodes, digeneans, cestodes, and crustaceans are the most significant parasites affecting fish. The highly specialized parasites known as helminths need certain, permanent hosts. They commonly appear in fish's viscera and bodily cavities. They may have an impact on one or more critical organ systems in the host fish because of their placement (Mitiku 2021). Dactylogyroidea is the most prevalent monogenean found in inland water fish. Mongoneans are classified into multiple primary groups. Except for Gyrodactylidae, which are skin parasites, the majority of dactylogyroids are gill parasites. A single host is involved in the direct life cycle of monogeneans (Mitiku 2021). Fish that have parasites may suffer from mechanical, physiological, and reproductive harm. Fish health issues are caused by a class of organisms known as fish parasites. Some parasites produce eggs, while others have suckers that they cling to. To live and proliferate inside a different host, parasites can alter their immunological and biochemical makeup. Numerous parasite illnesses that either directly or indirectly cause fish mortality afflict fish everywhere in the world (Hussain 2022).

In ornamental fish farms, where high temperatures and organic content speed up parasite life cycles and encourage their spread, ectoparasitic protozoa are listed as the main issue

(Saha 2015). The protozoan *Ichthyophthirius multifiliis* (Ich) is the cause of *Ichthyophthiriasis*, commonly referred to as "white spot disease," which is arguably the most serious parasite illness affecting freshwater fish in both the wild and culture. Light infections frequently result in minimal skin tissue damage, preventing fish mortality. Nonetheless, increased ectoparasite infection levels can seriously harm fish populations, particularly in intensive farms with high stocking densities (Nguyen 2020). The disruption of the gill epithelia and epidermis caused by the trophont's emergence from the fish host may interfere with osmoregulation and make the fish more vulnerable to subsequent infections (von Gersdorff Jørgensen 2017). Copepodes interact with their hosts in various ways. It has the potential to have pathogenic repercussions that seriously harm the economy. Typically located on the external surfaces of their hosts, parasitic *copepods* are frequently entrenched in microhabitats including vaginal folds, noses, and gills (Al-Quraishy 2021).

Aim of the study:

This research aimed to identify the parasites present in freshwater ornamental fish and subsequently ascertain the frequency of certain parasites within the Sulaimani fish sector.

Material and Method:

Isolation and identification of the parasite

1. Collection of Fish samples

A total of 75 fish samples including 40 Guppy (*Poecilia reticulata*) and 35 Molly (*Poecilia sphenops*) fish species from different stores of fish shopping in Sulaimani City between

January to the end of April 2024. The collected fish samples after one to two hours were transported in a cool box filled with water to the Zoology Laboratory at the Department of Biology, College of Science, University of Sulaimani, parasitological analysis. Measurements were taken of each fish sample's body total length of the fish was taken from the tip of the head to the posterior tip of the caudal fin.

2. Examination of fish samples

Fish samples were examined macroscopically by physical signs that can be seen like white spots on their skins and the weakness of the fish, and microscopically examination using a compound light microscope for parasitological studies in the laboratory. The smears were prepared from the scraping of skin, and the gills of recently dead fish were inspected for parasites, Using recently collected specimens makes it easier to see moving parasites under the microscope and fin for examination. The gills on both sides were detached, and placed in a Petri dish with normal saline. Gill filament wet mounts were prepared and examined under a light microscope.

3. Photo and Measurements

Photos were taken with a mobile iPhone Digital camera model Xs Max, 12 megapixels under x10 and x40 magnification.

4. Statistical analysis

The collected data to identify parasites from fish samples was done by Microsoft Excel.

Result:

The present study showed the existence of two species of protozoans (*Ichthyophthirius multifiliis*) (Figures 1 a, b and c), *Trichodina* sp. (Figure 2), Copepodal stage of *L. cyprinacea* (Figure 3), and one species of monogeneans *Gyrodactylus baicalensis* (Figure 4). The 75 fish were examined, including 40 guppy (Figure 5) and 35 molly (Figure 6); the infected fish of guppy were 12 and 8 for molly fish. The infection rate among all fish samples was 26.66%, while the result showed 30% for guppy and 22.85% for molly as shown in Tables (1 and 2) respectively. Also, the Total length of the guppy fish was 3.8 cm and the molly was 4.7 cm.

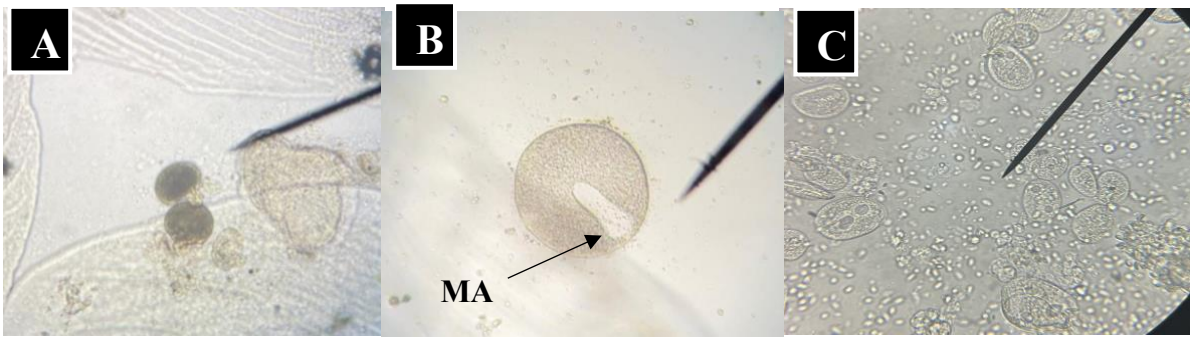

Figure 1: *Ichthyophthirius multiphilius*. A and B: Photomicrograph of mature trophont (100X). C- Photomicrograph of theront stage (100X). MA: macronucleus.

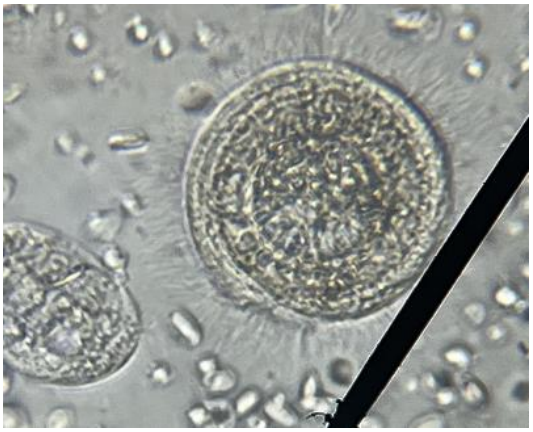

Figure 2: *Trichodina sp*.

Figure 3: *Copepodal* stage of *Lenaea cyprinacea*

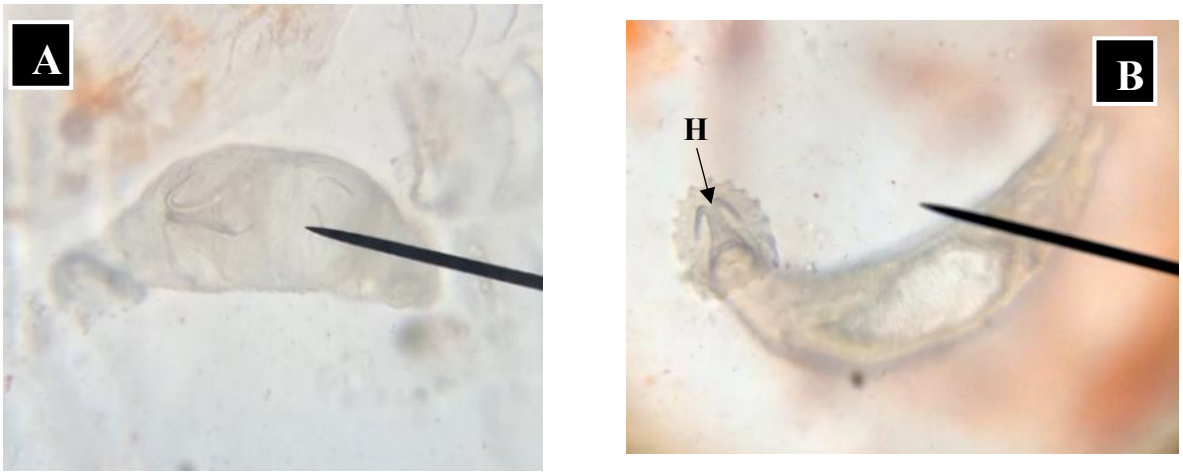

Figure 4: *Gyrodactylus baicalensis*

A: - Photomicrograph of the adult stage (100X).

B: - Photomicrograph of the haptor (100X)

Table 1. The distribution of parasites from guppy in the present study

fish	No. of examined fish	Types of ectoparasites	positive sample	Infectious site
Guppy	40 Guppy fish	- Protozoa		
		Ichthyophthirius multifiliis	2 fish	Skin and Gill
		Trichodina sp	1 fish	Gill
		- Monogenea		
		Gyrodactylus baicalensis	9 fish	Skin and Gill

Figure5. Guppy fish

Table 2. The distribution of parasites from molly in the present study

fish	No. of examined fish	Types of ectoparasites	positive sample	Infectious site
Molly	35 molly fish	- Protozoa		
		Ichthyophthirius multifiliis	3 fish	Skin and Gill
		Trichodina sp	1 fish	Gill
		- Crustacea		
		Copepodal	4 fish	Skin

Figure6. Molly fish

Discussion

The study's observation of several protozoan and monogenean species emphasizes how vulnerable fish populations are to different parasitic diseases. Notably, identifying Ichthyophthirius Multifiliis, Trichodina sp., and Gyrodactylus Baicalensis highlighted the variety of parasites that can impact fish health. There is hardly any research on ectoparasites in ornamental fish in our region. particularly on guppy and molly fish. In contrast to our work, looking into other research published in the Iraq/Kurdistan region, we have observed that other ectoparasite species, including *Dactylogyrus* cf. *Vastator* (Abdullah 2013), *Tetrahymena corlissi* (Abdullah 2015) and *Gyrodactylus turnbulli* (Abdullah 2013) have been observed there. There could be several reasons for the different findings, including the fact that the majority of research studies were long-term, samples were examined in all four seasons, and seasonal parasites were discovered. However, we conducted our investigation only throughout the winter and spring.

An overall infection incidence of 26.66% was found. Interestingly, guppies had a higher infection rate (30%) than mollies (22.85%), which may indicate susceptibility differences between species or that environmental factors affect the incidence of parasites. The percentage of parasitized fish discovered in this investigation differed throughout farms, though. This could be a real difference or it could be explained by the various numbers of fish selected from each farm, which led to varying detection probabilities. Low temperatures cause the dissolved oxygen level to rise, which is crucial for parasites' activity, particularly those with a direct life cycle (some crustaceans and protozoans), which shortens their generation times in semi-cold water and multiplies their population (Wharton 1999). In addition to other characteristics like behavior and immunological response, larger fish species, like molly, may be less susceptible to specific parasites because of their size. Human skin irritation or allergic reactions may result from handling contaminated water or diseased seafood. To lower the danger of any potential health problems connected to handling fish contaminated with pathogens, it is crucial to practice appropriate hygiene, such as completely washing hands after handling fish or cleaning aquarium equipment (Sharp 2014).

Fish become parasitized due to interactions between the parasite, the fish, and the

surroundings. Changes in the environment and management techniques, such as handling, crowding, transit, pharmacological treatments, undernourishment, temperature swings, and poor water quality, have a constant impact on fish kept in intensive cultures (Mziri 2022).

Conclusion: Finally, the microscopic examination of ectoparasites in ornamental molly and guppy fish provided important information about the availability, identity, and possible effects of these parasites on the fish's health. Researchers and aquatic professionals can gain a better understanding of the dynamics of parasitic illnesses in these common aquarium species by identifying and describing the ectoparasites present. Sufficient study in this field is important to devise efficacious preventive and therapeutic measures that guarantee the welfare and longevity of molly and guppy fish populations kept in captivity."

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